

Please write clearly in block capitals.

Centre number

Candidate number

H

Surname

Forename(s)

Candidate signature

I declare this is my own work.

GCSE
MATHEMATICS
Higher Tier Paper 1 Non-Calculator
8300/1H
Predicted Practice Paper
Time allowed: 1 hour 30 minutes

IMPORTANT — PLEASE READ: PREDICTED PRACTICE PAPER — not an official AQA paper, not a past paper, and not endorsed by or affiliated with AQA. All questions are original. Topics were chosen by analysing previous exam papers, but they are NOT guaranteed to appear in any real examination. Revise the full specification.

Materials

For this paper you must have:

- mathematical instruments
- the Formulae Sheet (enclosed)

You must NOT use a calculator.

Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer all questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- You may ask for more answer paper, graph paper and tracing paper.

Advice

- In all calculations, show clearly how you work out your answer.

Turn over

Formulae Sheet

Area of a trapezium	$= \frac{1}{2} (a + b) h$
Volume of a prism	$= \text{area of cross-section} \times \text{length}$
Pythagoras' theorem	$a^2 + b^2 = c^2$
Quadratic formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Circumference of a circle	$= 2\pi r$
Area of a circle	$= \pi r^2$
Curved surface area of a cylinder	$= 2\pi r h$
Volume of a cylinder	$= \pi r^2 h$
Volume of a sphere	$= \frac{4}{3} \pi r^3$
Surface area of a sphere	$= 4\pi r^2$
Volume of a cone	$= \frac{1}{3} \pi r^2 h$
Curved surface area of a cone	$= \pi r l$
Sine rule	$a / \sin A = b / \sin B = c / \sin C$
Cosine rule	$a^2 = b^2 + c^2 - 2bc \cos A$
Area of a triangle	$= \frac{1}{2} ab \sin C$
Compound interest	$= P (1 + r/100)^n$

Exact trigonometric values: $\sin 30^\circ = \cos 60^\circ = 1/2$; $\sin 60^\circ = \cos 30^\circ = \sqrt{3}/2$; $\sin 45^\circ = \cos 45^\circ = \sqrt{2}/2$; $\tan 45^\circ = 1$.

DO NOT WRITE IN THIS AREA

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 A charity website recorded 4 500 000 visitors in one year.

(a) Write 4 500 000 in standard form.

----- (1)

(b) The diameter of a red blood cell is 7.2×10^{-3} mm. Write this as an ordinary number.

----- (1)

(Total for Question 1 is 2 marks)

DO NOT WRITE IN THIS AREA

2 (a) Write $5^3 \times 5^4 \div 5^2$ as a single power of 5.

----- (1)

(b) Write $(4^2)^3 \div 4^4$ as a single power of 4.

----- (1)

(Total for Question 2 is 2 marks)

DO NOT WRITE IN THIS AREA

3 Work out $\frac{3}{4} + \frac{2}{5}$

Give your answer as a mixed number in its simplest form.

(Total for Question 3 is 2 marks)

DO NOT WRITE IN THIS AREA

4 A copper rod has length 8.5 cm and an aluminium rod has length 2.4 cm.
Both lengths are measured correct to 1 decimal place.

(a) Write down the upper bound of the length of the copper rod.

----- (1)

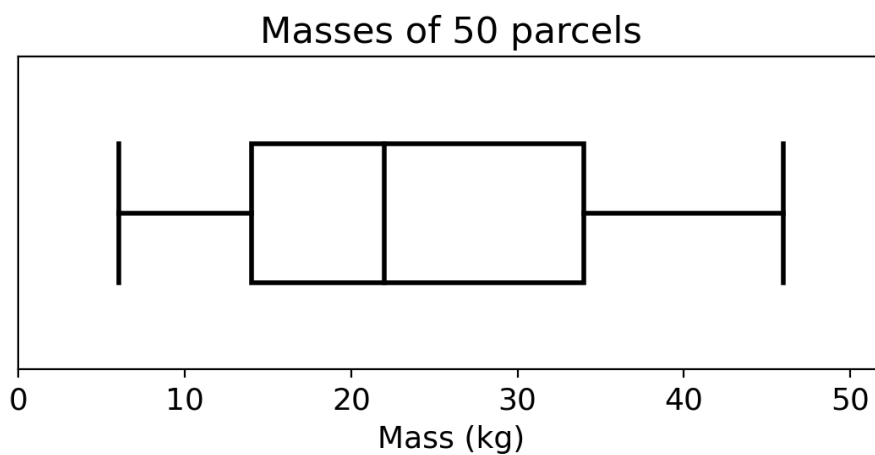
(b) Work out the upper bound of the total length of the two rods.

----- (1)

(Total for Question 4 is 2 marks)

DO NOT WRITE IN THIS AREA

- 5 The box plot shows the masses, in kilograms, of 50 parcels handled by a courier in one day.



- (a) Write down the median mass of the parcels.

----- (1)

- (b) Work out the inter-quartile range of the masses.

----- (1)

(Total for Question 5 is 2 marks)

DO NOT WRITE IN THIS AREA

6 Nadia and Omar share £96 in the ratio 5 : 3.
Work out how much more Nadia receives than Omar.

(Total for Question 6 is 3 marks)

7 Write 168 as a product of its prime factors.
Give your answer in index form.

(Total for Question 7 is 2 marks)

DO NOT WRITE IN THIS AREA

- 8** Write the recurring decimal $0.454545\dots$ as a fraction in its simplest form.

(Total for Question 8 is 2 marks)

- 9** A coat is sold in a sale for £238.
This price is after a 15% discount.
Work out the original price of the coat.

(Total for Question 9 is 3 marks)

DO NOT WRITE IN THIS AREA

10 A triangle has base $(x + 2)$ cm and vertical height 8 cm.
The area of the triangle is 48 cm^2 .
Work out the value of x .

(Total for Question 10 is 3 marks)

DO NOT WRITE IN THIS AREA

11 Solve the simultaneous equations

$$x + 2y = 14$$

$$3x - y = 7$$

(Total for Question 11 is 3 marks)

DO NOT WRITE IN THIS AREA

12 Solve $x^2 + 6x + 8 = 0$

(Total for Question 12 is 3 marks)

13 $3p - q = 5r$

Make p the subject of the formula.

(Total for Question 13 is 2 marks)

DO NOT WRITE IN THIS AREA

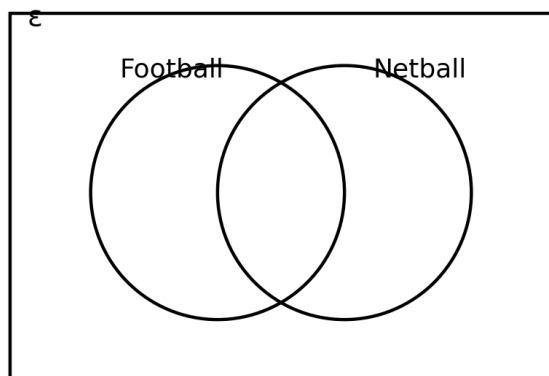
14 The first four terms of a sequence are 2, 6, 12, 20.
Find an expression, in terms of n , for the n th term of the sequence.

(Total for Question 14 is 3 marks)

DO NOT WRITE IN THIS AREA

15 40 students were asked whether they play football and whether they play netball.

19 play football. 14 play netball. 9 play both football and netball.



(a) Complete the Venn diagram.

----- (1)

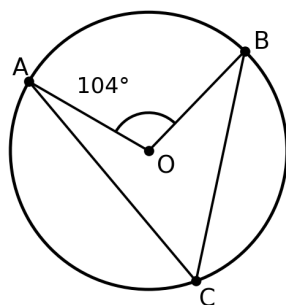
(b) A student is chosen at random. Work out the probability that the student plays netball but does not play football.

----- (1)

(Total for Question 15 is 2 marks)

DO NOT WRITE IN THIS AREA

- 16** In the diagram, O is the centre of the circle and points A, B and C lie on the circumference. Angle $AOB = 104^\circ$.



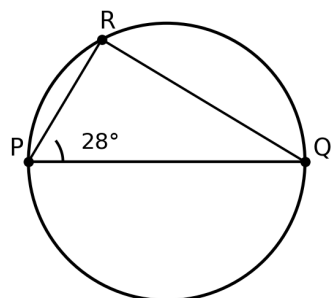
Not drawn accurately

- (a) Work out the size of angle ACB. Give a reason for your answer.

(2)

DO NOT WRITE IN THIS AREA

P and Q are points on the circumference of a second circle such that PQ is a diameter of the circle. R is a point on the circumference and angle QPR = 28° .



Not drawn accurately

(b) Work out the size of angle PQR.

(2)

(Total for Question 16 is 4 marks)

DO NOT WRITE IN THIS AREA

17 You are given that $\sin 45^\circ = \sqrt{2}/2$ and $\cos 60^\circ = 1/2$.
Show that $\cos^2 60^\circ + \sin^2 45^\circ = 3/4$

(Total for Question 17 is 3 marks)

DO NOT WRITE IN THIS AREA

18 (a) Simplify $2\sqrt{12} - \sqrt{27}$, giving your answer in its simplest form.

----- (2)

(b) Rationalise the denominator of $5/\sqrt{5}$, giving your answer in its simplest form.

----- (2)

(Total for Question 18 is 4 marks)

DO NOT WRITE IN THIS AREA

- 19** (a) y is directly proportional to x . When $x = 5$, $y = 30$. Work out the value of y when $x = 9$.

----- (2)

- (b) P is inversely proportional to the square of Q . When $Q = 3$, $P = 8$. Work out the value of P when $Q = 2$.

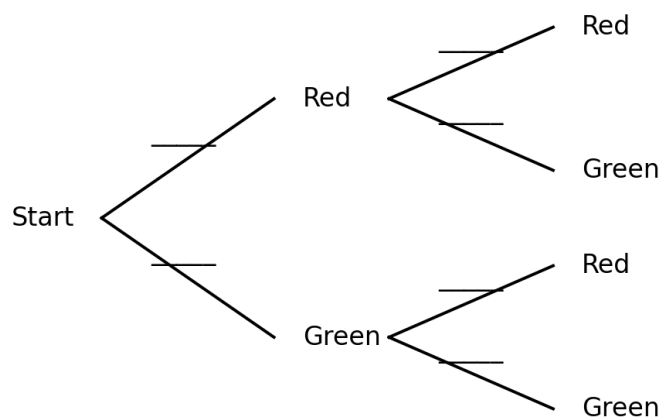
----- (2)

(Total for Question 19 is 4 marks)

DO NOT WRITE IN THIS AREA

20 A bag contains 4 red discs and 3 green discs.

Priya takes two discs from the bag at random, without replacement.



(a) Complete the probability tree diagram.

----- (2)

(b) Work out the probability that Priya takes two red discs.

----- (1)

(Total for Question 20 is 3 marks)

DO NOT WRITE IN THIS AREA

21 (a) Write $x^2 + 8x + 12$ in the form $(x + p)^2 + q$.

----- (2)

(b) Write down the coordinates of the turning point of the curve $y = x^2 + 8x + 12$.

----- (1)

(Total for Question 21 is 3 marks)

DO NOT WRITE IN THIS AREA

22 Simplify fully $(x^2 - 16)/(4x + 16)$.

(Total for Question 22 is 3 marks)

DO NOT WRITE IN THIS AREA

23 $x_{n+1} = (x_n + 6 \div x_n) \div 2$, and $x_0 = 2$.

(a) Work out the values of x_1 and x_2 .

----- (2)

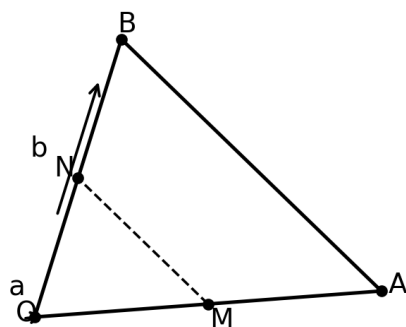
(b) Use your answers to part (a) to write down an estimate for $\sqrt{6}$.

----- (1)

(Total for Question 23 is 3 marks)

DO NOT WRITE IN THIS AREA

24 OAB is a triangle. The vector $\vec{OA} = \mathbf{a}$ and the vector $\vec{OB} = \mathbf{b}$.
M is the midpoint of OA and N is the midpoint of OB.



Not drawn accurately

(a) Write down the vector $\vec{AB}$ in terms of $\mathbf{a}$ and $\mathbf{b}$.

(1)

DO NOT WRITE IN THIS AREA

(b) Show that MN is parallel to AB.

(3)

(Total for Question 24 is 4 marks)

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25 Prove that $(n + 2)^2 - (n - 2)^2$ is always a multiple of 8.

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(Total for Question 25 is 4 marks)

26 $f(x) = 2x - 1$ and $g(x) = x^2 + 2$.

(a) Work out $gf(3)$.

----- (2)

(b) Find $f^{-1}(x)$, the inverse function of f .

----- (2)

(Total for Question 26 is 4 marks)

DO NOT WRITE IN THIS AREA

27 A bag contains n red counters and 4 blue counters.
Two counters are taken from the bag at random, without replacement.
The probability that both counters are blue is $\frac{1}{6}$.
Work out the value of n .

DO NOT WRITE IN THIS AREA

(Total for Question 27 is 5 marks)

END OF QUESTIONS